Two Year Post Graduate Degree Course in Master of Engineering (Full-Time)
Digital Electronics

Appendix-C

First Semester

Sr. No.	Subject Code	Subject	TEACHING SCHEME HOURS / WEEK Lecture	Tutorial	Practical	Total HOURS	CREDITS	EXAMINATION SCHEME THEORY DURATION OF PAPER (Hr.)	MAX. MARKS THEORY PAPER	MAX. MARKS COLLEGE ASSESMENT	TOTAL	MIN. PASSING MARKS THEORY PAPER	MIN. PASSING MARKS SUBJECT	PRACTICAL MAX. MARKS EXTERNAL	MAX. MARKS INTERNAL	TOTAL	MIN. PASSING MARKS
01	1UMEF1	DIGITAL INSTRUMENTATION	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
02	1UMEF2	ADVANCED DIGITAL SIGNAL PROCESSING	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
03	1UMEF3	ELECTIVE-I	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
04	1UMEF4	DIGITAL COMMUNICATION TECHNIQUES	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
05	1UMEF5	EMBEDED SYSTEM DESIGN	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
06	1UMEF6	DIGITAL COMMUNICATION TECHNIQUES-LAB.	0	0	2	2	1	_	_	_	_	_	_	25	25	50	25
07	1UMEF7	EMBEDED SYSTEM DESIGN-LAB.	0	0	2	2	1	_	_	_	_	_	_	25	25	50	25
		TOTAL	20	0	4	24	22				500					100	
															TOTAL		600

Elective - I : 1) Modern Electronic Design Techniques 2) RF System Design 3) Computer Communication Network

Second Semester

Sr. No.	Subject Code	Subject	TEACHING SCHEME HOURS / WEEK Lecture	Tutorial	Practical	Total HOURS	CREDITS	EXAMINATION SCHEME THEORY DURATION OF PAPER (Hr.)	MAX. MARKS THEORY PAPER	MAX. MARKS COLLEGE ASSESMENT	TOTAL	MIN. PASSING MARKS THEORY PAPER	MIN. PASSING MARKS SUBJECT	PRACTICAL MAX. MARKS EXTERNAL	MAX. MARKS INTERNAL	TOTAL	MIN. PASSING MARKS
01	2UMEF1	DIGITAL IMAGE PROCESSING	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
02	2UMEF2	CMOS VLSI DESIGN	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
03	2UMEF3	PARALLEL COMPUTING	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
04	2UMEF4	ARTIFICIAL INTELLIGENT SYSTEMS	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
05	2UMEF5	ELECTIVE-II	4	0	0	4	4	3	80	20	100	40	50	_	_	_	_
06	2UMEF6	DIGITAL IMAGE PROCESSING-LAB.	0	0	2	2	1	_	_	_	_	_	_	25	25	50	25
07	2UMEF7	CMOS VLSI DESIGN-LAB.	0	0	2	2	1	_	_	_	_	_	_	25	25	50	25
		TOTAL	20	0	4	24	22				500					100	
															TOTAL		600

Elective - II : 1) Bio-Informatics 2) Micro Electro Mechanical System 3) High Speed Digital System Design

Two Year Post Graduate Degree Course in Master of Engineering (Full-Time)
Digital Electronics

Appendix-C

Third Semester

Sr. No.	Subject Code	Subject	Lecture	Tutorial	Practical	Total	CREDITS		INTERNAL MARKS	TOTAL	MIM. PASSING MARKS
01	**3UMEF1**	SEMINAR AND DISSERTATION	_	_	6	6	15		100	100	50
		TOTAL	**_**	**_**	**6**	**6**	**15**			**100**	
										TOTAL	**100**

Fourth Semester

Sr. No.	Subject Code	Subject	Lecture	Tutorial	Practical	Total	CREDITS		EXTERNAL MARKS	INTERNAL MARKS	TOTAL	MIM. PASSING MARKS
01	**4UMEF1**	SEMINAR AND DISSERTATION	_	_	12	12	30		200	100	300	150
		TOTAL	**_**	**_**	**12**	**12**	**30**				**300**	
											TOTAL	**300**

GRAND TOTAL 1600

Semester III

Seminar : Seminar to be delivered on work completed during third semester. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.

Dissertation : Title of the dissertation work to be submitted to the University on or before 15th Sept. (for regular examination) and 15th of February (for supplementary exam.).

Semester IV

Seminar : to be delivered on the complete work of dissertation. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.

Note : Thesis of dissertation work must be submitted to the University on or before 30th April (for regular exam.) and 30th November (for supplementary exam.). Thesis of Dissertation work be submitted with late fee to the University upto 31 May (for regular exam.) and 31st December (for supplementary exam.). The late fee shall be charged as in case of Examination form.

Notes : 1. Student should fill the examination form in the begining of III semester jointly for III & IV semester.

2. Single marksheet for III & IV semester together will be given to the student.

SYLLABUS PRESCRIBED FOR
THREE / TWO YEAR POST GRADUATE DEGREE COURSE IN
MASTER OF ENGINEERING (PART TIME) / (FULL TIME)
DIGITAL ELECTRONICS

1UMEP1 / 1UMEF1 DIGITAL INSTRUMENTATION

SECTION A

Unit-I Digital time measurement techniques:
Vernier technique for small time interval measurement, Measurement of periodic time, Measurement of phase, capacitance, quality factor, time constant & decibel .
Digital frequency measurement techniques:
Measurement of ratio, product & difference between two frequencies, High frequency measurement, Maxima & Minima frequency measurement , Peak Frequency measurement, Fast low frequency measurement.

Unit-II: Electronic instrument for signal analysis:
Signal Analyzer: Spectrum analyzer, Network analyzer, Wave analyzer, Distortion analyzer, Logic Analyzer, Protocol analyzer.
Automated Measurement Systems:
Need & requirement of Automatic test equipment (ATE), Computer based & computer controlled ATE, ATE for PCB, Component testing. IEEE-488 electronic instrument Bus standard, Field Bus application. Instrumentation in Hazardous area.

SECTION B

Unit-III:Microcontroller & PC based Data acquisition system:
Data acquisition system: Introduction to smart sensors, digital sensors, Case studies of real time PC based instrumentation system, Virtual instruments, Intelligent instrument & Role of software.
Computer control: Hierarchy of computer control for industry, Direct digital control, Distributed computer control: System architecture & implementation concepts, buses & communication networks of DCCS, SCADA system.
Unit-IV:Advanced medical instrumentation systems:
Microprocessor interfacing & computer based Medical instrumentation System, Real time digital conditioning of monitored bio-medical signals such as EEG, ECG, EMG, & VEP .
Intelligent controllers:
Discrete State Process control, Relay Sequencer & Ladder Diagram Programmable logic controllers, PLC programming techniques, Introduction to fuzzy logic & Neural network controllers.

Text Books:
1. Digital Measurement Techniques, 1996 by T.S.Rathore, Narosa publishers, New Delhi Second Edi.
2. Instrumentation & Process, Critis Johnson (PHI Publication)

Reference Books :
1. Electronic Instruments Handbook (3/e), 1997 by Clyde E. Coombs, McGraw Hill International
2. Applied Electronics Instrumentation & Measurement, 1992 by McLachlan & Buchala, Prentice Hall International
3. Khandpur R.S., Handbook of Bio-medical Instrumentation (3/e)
4. Computer Based Industrial Control by Krishnkant , PHI , 5TH Edition.
5. Digital Signal Processing by Cavicchi (John Willey Publication)

1UMEP2/1UMEF2 ADVANCED DIGITAL SIGNAL PROCESSING

SECTION - A

Unit I : Introduction : Overview of Discrete time signals and systems: Convolution, correlation, Time Bandwidth Relationships, Introduction to Random signal Processing and Statistical Signal Processing. Different transforms, use of DFT in linear filtering, filtering of long data sequences, Algorithm for convolution and DFT. FFT algorithms.

Unit II : Digital filter Design: FIR and IIR Filter Design techniques, Introduction to Multirate Digital Signal , Implementation of Sampling Rate Converter, Filter Bank Implementation, Sub-band Coding.

SECTION - B

Unit III : Adaptive Digital Signal Processing: Spectral Estimation using Least Square(LS), Least Mean Square (LMS), Recursive Least Square (RLS) Algorithms. Applications to Speech and Audio Signal Processing

Unit IV : Issues involved in DSP processor design, Architecture and programming of TMS 320 C67XX, Applications of DSP to Biomedical Signal Processing.

Text Books :

1) Digital Signal Processing: Principles , Algorithms and Applications by J G Proakis, D.G. Monalikis PHI (3rd Edition)
2)Discrete Time Signal Processing, A.V. Oppenheim and Schafer, PHI.

Reference Books :

1) Discrete Time Signal Processing A practical Approach, E.C. Ifeacher & B.W. Jarvis Pearson Education 3rd Edition.
2) A Course in Digital Signal Processing, Porat ,Boaz John Willey and Sons
3) Digital Signal Processing, S.K. Mitra, TMH(2nd Edition)
4) Digital Signal Processing, T. J. Cavicchi, John Willey and Sons
5) DSP Handbook Vijay Medisetti & D.B. Williams CRC Press
6) Adaptive Filter Theory, Simon Haylein Jhon Wiley
7) Fundamentals of Statistical signal Processing by Steven Key, Pearson Education.

1UMEP3 / 1UMEF3 ELECTIVE –I

1) Modern Electronics Design Technique

Unit – I : Amplifiers & Regulators System Design : Digital isolation techniques, high speed clamping amplifiers, programmable gain amplifiers, auto – zero amplifiers, lock – in amplifiers, switch mode regulator topologies like buck, boost, buck boost their control techniques and selection of passive, active (IGBT, GTO, MOSFET, Diode) and magnetic components for these regulators, simulation of these systems using PSIM and related software.

Unit – II : Communication and control system design : Electronic navigation systems, underwater sound systems, phase lock loop design, direct digital synthesis, radio systems and auto pilot systems in aircraft, digital engine control and motion control systems for automobiles, simulation of these systems using related software's.

Unit – III : Portable Electronics system design : Types and characteristics of modern batteries, smart battery management systems, portable devices like mobile TV, VolP phones, glucose meter, pulse oximetry, cardio pulmonary resuscitation systems , ultrasound systems, Barcode readers, payment terminals.

Unit – IV : Electronic system design for production : Layout and grounding for analog & digital systems, safety, testablility, reliability and thermal management in electronic systems, quality, reliability, testing and environmental aspects in printed circuit board design, design of enclosures for electronic products, EMC of electronic products.

Text Books :

1.Linear Circuit Design Handbook by Zumbahlen Elsevier, Analog Devices Corp.
2.Circuit Design, Knowit All by Ashby, Baker Elsevier

Reference Books :

1.Demystifying switching power supplies by Mach., Elsevier

2.Standard handbook of Electronic Engg. (5th Ed) by Chritiansen & Alexander MGH
3.Digital Frequency synthesis Demystified by Goldberg LLH Pub.
4.Aircraft Digital Electronic & Comp. System by Tooley Elsevier
5.Aircraft Electricity and Electronics by Bent.
6.Battery operated devices and systems by Pitoia, Elsevier
7.Understanding Automotive electronics (6th Ed) by Ribbens Elesevier
8. Grounding & Shielding Ckt & interfacing (5th Ed) by Morrison Wiley
9 Printed Ckt. Boards by Khandpur MGH

1UMEP3 / 1UMEF3 ELECTIVE –I

2) RF SYSTEM DESIGN

UNIT-I ACTIVE RF COMPONENTS AND THEIR MODELING

Active RF Components: Semiconductor Basics: Physical properties of semiconductors, PN-Junction, Schottky contact. **Bipolar-Junction Transistors:** Construction, Functionality, Temperature behavior, Limiting values. **RF Field Effect Transistors:** Construction, Functionality, Frequency response, Limiting values. **High Electron Mobility Transistors:** Construction, Functionality, Frequency response. **Active RF Component Modeling:** Transistor Models: Large-signal BJT Models, Small-signal BJT Models, Large-signal FET Models, Small-signal FET Models.

UNIT-II FILTER and AMPLIFIER DESIGN

RF filter Design methods: Image Parameter Method, Insertion Loss Method, Microstrip Filter Design **Filter Implementation:** Unit Elements, Richard's Transformation, Kuroda's Identities and Examples of Microstrip. **High frequency amplifier design:** Bandwidth enhancement, neutralization and unilateralisation, cascaded amplifiers. **RF power amplifier design:** Class A to Class F amplifiers and modulation characteristics.

UNIT-III LNA, Mixers and oscillators design

LNA topologies and their design, linearity and large signal performances, multipliers and sub sampling mixers, High Frequency Oscillator Configuration: Fixed Frequency Oscillator, Voltage Controller Oscillator and Dielectric Resonator Oscillator

UNIT-IV PLL design

Linearized PLL models, Noise properties of PLLs, Phase detectors, Sequential phase detectors, Loop filters and charge pumps, design examples

Text Books :

1. Microwave Transistor Amplifiers, Analysis and Design by G. Gonzalez ; Prentice Hall
2. RF Circuit Design-Theory and Applications by Reinhold Ludwig and Pavel Bretchko; Pearson Education

Reference Books :

1. Thomas Lee, " The Design of CMOS RF ICs", Cambridge second edition
2. Microwave Engineering by David M. Pozar; Wiley & Sons (ASIA) Pvt. Ltd.
3. Radio Frequency and Microwave Electronics by Matthew M Radmanesh
4. Microwave Circuit analysis and Amplifier Design by S. Y. Liao; Prentice Hall

1UMEP3 / 1UMEF3 ELECTIVE –I

3) COMPUTER COMMUNICATION NETWORKS

Section - A

Unit I Review of computer networking concepts: *(Introductory portion removed)* OSI/ISO Reference Model, TCP/IP reference models, Point to point protocols.

ARQ: Retransmission strategies.

Functional elements : Multiplexing, Switching , Networks Management & traffic

controls. Delay models in Data Networks Switching techniques: Performance measures & architectural issues.

Unit II Internetworking : TCP/IP Internet architecture, IPV4, IPV6, IP addressing & related issues, IP address resolution techniques (ARP). IP datagram & forwarding, *Queuing Models*, *Routers,* routing algorithms.

Section - B

Unit III Multiple access techniques: CSMA/CD, CSMA/CA, CDMA, OFDM, Delay throughput characteristics, WLAN-Protocols**, multiple access Protocols**, Ad-hoc networks, WAP, Bluetooth Specifications, *3G Evolution and Architecture.*

Unit IV Network security issues : Ciphers, DES, Public key cryptography, RAS algorithm, Digital Watermarking, Attacks and Counter Measures , Service Authentication Proforma.

Text Books :

1. Communication Networks – Leon Garcia & Wadeja, Tata McGraw Hill Publication.
2. "Computer Networks and Internetworking"D.E.Comer, Pearson Education

Reference Books :

1) "Data Networks" Dimitri Bertisekas & Robert Gallager, PHI
2) "Local Area Networks", Gerd E Kieser – Mc-Graw-Hill
3) "Cryptography and Network Security: Principles and Practice", William Stallings, Pearson Education
4) "GSM, CDMA and 3G Systems" , Steele,, Wiely Students Edition

2UMEP1/1UMEF4 DIGITAL COMMUNICATION TECHNIQUES

Section : - A

Unit -I

Characterization of communication signal and optimum receiver for AWGN Channel :
Signal space representation, Memory less modulation methods, Linear Modulation with memory, Non linear modulation methods with memory,-CPFSK & CPM, Power spectral of linear modulated signal, CPFSK & CPM Signals, Correlation demodulator, Match filter demodulator, Optimum detector, Probability of error for binary & M-array signals.

Unit – II

Source & channel coding: Discrete stationary sources, Lampel Ziv algorithm, Coding of analog sources, Rate distortion functions, Scalar quantization & vector quantization, Temporal & spectral waveform coding, BCH codes, Reed – Solomon codes, Reed Muller codes, convolution codes, transfer function of convolution codes, Viterbi decoding algorithm, stack algorithm (no problems expected) trellis coded modulation.

Section : B

Unit – III

Signal Design for band limited channel & equalization.: Design of banc limited signal for zero ISI, Nyquist criterion, design of band limited signal for controlled ISI, partial response signal. Data detection for controlled ISI, Linear Equalization – peak distortion criteria, mean square error (MSE) criteria, decision feedback equalization, coefficient optimization, adaptive linear equalization, zero forcing algorithm

Unit - IV

Spread Spectrum techniques : Generation of PN sequence, direct sequence spread spectrum system , processing gain, jamming margin, application of direct sequence spread spectrum signal, frequency hopped spread spectrum signal, time hopping spread spectrum signal, synchronization of spread spectrum signal - acquisition & tracking.

Text Books :

1. J G Proakis, " Digital Communication" Fourth Edi. MGH
2. Shu Lin & Costell , " Error Control Coding – Fundamentals & applications," Addison Wessley Pub.

Reference Books :

1. Bernard Sklar, " Digital Communication" Fundamental & application , Second Edi. Pearson education, Asia.
2. Simon Haykins ; Digital Communication" John Wiley & Sons.
3. J P Proakis, M Salehi, " Communication System Engineering" Second Edi. Pearson Edition (LPE)
4. Salvatore Gravano, " Introduction to Error Control Codes", 1st Edition, Oxford Press.
5. Stephen Wicker, " Theory of Error Correcting Codes", PHI
6. K S Shanmugan; " Digital & Analog Communication System" John Wiley & Sons.

2UMEP2 / 1UMEF5 EMBEDDED SYSTEM DESIGN

Section - A

Unit I : Embedded System hardware : Embedded systems overview, Hardware components like microcontroller, GPP,ASSP,AISP, SOC, Details of 32 bit ARM SoC architecture, Organisation, analog, digital & high speed I/O for embedded systems, interfacing SRAM, DRAM, flash memories with microcontroller, memory management, allocation of memory to program segments and blocks, memory maps.

Unit II : Embedded System Software : Techniques of writing efficient C code for microcontroller C data types for ARM, Signed & unsigned data types, limitation of char & char & data types, storage class – static & extern, volatile keyword, operation on bits, functions, ARM / Thumb procedural call standard, pointers & arrays, conditional statements – of-else, switch, structure, conditional loops – for & while, preprocessing, compiling, cross compiling, compiler driver, startup code and board support packages, program segments calling assembly routines in C, interrupt handling in C, interrupt latency.

Section - B

Unit III : Uniprocessor Real Time Scheduling: Real time systems, tasks and its states, task assignment & scheduling, scheduling algorithms – rate monotonic and earliest deadline first, inter- task communication, semaphore, priority inheritance protocol, priority ceiling protocol, real time operating system features, features of micro C OS – II RTOS.

Unit IV : Embedded System Architecture & Design : Embedded system implementation aspects & estimation modeling, embedded system architecture, validation and debugging of embedded systems, hardware – software co-design in an embedded system, ARM Philips NXP LPC 2148 programming on – chip components like ADC and interfacing external peripherals like keyboard, LCD, Stepper motor.

Text Books :

01) Embedded Systems (2nd Edi) by Rajkamal (Tata McGraw Hill)
02) Embedded Real-time Systems Programming by Lyer & Gupta (Tata McGraw Hill

Reference Books :

01) ARM System on chip architecture (2nd Ed) by Furber (Pearson India)
02) Intro. To Embedded systems by K.V. Shibu (MGH)
03) Philips NXP LPC 2148 user manual
04) Scheduling in Real time systems by Cottet, Delacroix & Mammeri (John Wiley & Sons)

2UMEP3/1UMEF6 DIGITAL COMMUNICATION TECHNIQUES-LAB.

2UMEP4 / 1UMEF7 EMBEDDED SYSTEM DESIGN-LAB.

3UMEP1/2UMEF1 DIGITAL IMAGE PROCESSING

Section A

UNIT I

Image processing fundamental: Basic image processing Steps, Digital image representation,Image acquisition for grey scale and color, ,Human visual system Image types . Image Transforms: 2D DFT, Walsh transform ,Hadamard transform,Slant transform, Discrete transform ,KL transform, Radon transform and Multiresolution wavelet transform.

UNIT II

Image Enhancement: Image enhancement in spatial domain ,Enhancement through point operation,Types of point operation, Histrogram Manipulation, linear/nonlinear grey-level transformation,Local or neighbourhood operation, median filter,spatial domain high-pass filtering,bit-plane slicing,Image enhancement in the frequency domain,homomorphic filter,zooming operation ,image arithmetic.

Section B

UNIT III

Image Restoration and Denoising : Image degradation models, Types of image blur, image restoration model, linear image restoration,nonlinear image restoration techniques, blind deconvolution and classification technique ,image denoising, noise in image, median filtering, trimmed metrices in image restoration, Application of biomedical imaging

UNIT IV

Image segmentation: , region approach to image segmentation ,clustering technique, image segmentation based on thresholding, edge-based segmentation , edge detection ,edge linking, Hough transform ,active contour, watershed transformation, shape representation and classification. Morphological techniques, Object & pattern recognition & interpretation method.

Image Compression : Lossy block truncation & vector quantization , lossless Huffmon coding, runlength coding & block coding , transform coding.

Text Books :

1)"Digital Image Processing By R.C Gonzales & Woods –Addison Wesley IIIrd Ed
2)"Digital Image Processing" by S Jayaraman, S Esakkirajan,T Veerakumar- Tata Mc Graw Hill.

Reference Books :

1)" Fundamental Digital Image Processing "by A.K.Jain –Prentics Hall Inc.
2)"Digital Image Processing" By W.K Pratt IIIrd ed John Wiley
3) "Digital Image Processing and Analysis" by B Chanda and D. Mujumdar-PHI new Delhi

3UMEP2 / 2UMEF2 CMOS VLSI DESIGN

Unit I: CMOS design methods, CMOS Testing, CMOS subsystem design, CMOS system case studies. Fault tolerant VLSI architectures.

Unit II: ASIC Construction: Physical design, CAD tools, system partitioning, ASIC size estimation, Power dissipation issues, FPGA partitioning methods

Unit III: Floor planning, Placement, physical design flow, information formats, global routing, detailed routing, special routing, circuit extraction and DRC

Unit IV: CMOS Analog and RF Integrated Circuits: High speed comparators, Switch capacitor filters, RF power amplifier, Mixer, PLL.

Text Books :

1) "Application Specific IC" Michael John Sebastin, Smith Addison – Wesley Publication
2) "The Design of CMOS Radio-Frequency Integrated Circuits" Thomas H. Lee – Cambridge University press

Reference Books :

1) "Principles of CMOS VLSI Design" Neil Weste and Eshraghian – Person Education
2) "CMOS Analog Circuit Design" Phillip F. Allen, Douglas R. Holberg – Oxford University Press
3) "VLSI Design" M. Michael Vai – CRC press

3UMEP3/2UMEF6 DIGITAL IMAGE PROCESSING-LAB.

3UMEP4 / 2UMEF7 CMOS VLSI DESIGN-LAB.

4UMEP1 / 2UMEF3 PARALLEL COMPUTING

Section A

Unit I : **Introduction**

Parallel Computer Models, Flynn's classification, system attributes, multiprocessors and multicomputers, condition of parallelism, program partitioning and scheduling, program flow mechanism, performance metrics and measures, parallel processing applications, speed up performance laws.

Unit II : **Pipelining and superscalar Techniques**

Linear and non linear pipeline processors, reservation and latency analysis, collision free scheduling, instruction pipeline design, arithmetic pipeline design, superscalar and superpipeline design.

Section B

Unit III : **Parallel and scalable architectures**

Multiprocessor, Multicomputers, multivector and SIMD computers, scalable, multithread and dataflow architecture.

Unit IV : **Parallel Program Development and Environment**

Programming Parallel Computers, Parallel Programming environments, Synchronization and multiprocessing modes, multitasking,. Microtasking, autotasking, shared variable program structure, semaphores and applications, message passing program development, control decomposition techniques, heterogeneous processing.

Text Books :

1) "Advanced Computer Architecture", Kai Hwang, Parallelism, Scalability, Programmability", McGraw Hill Inc. Ed. 1993.
2) "Computer Architecture and Parallel Processing", Kai Hwang, F. A. Briggs, McGraw Hill, 1985

Reference Books :

1) "Elements of Parallel Computing", V. Rajaraman, PHI, 1990
2) "Computer organization & Architecture", William Stallings, PHI, New Delhi, 6th edition.
3) "Kalsuk'Advanced computer Architectures", Dezso'Sima, Terence Fountain & Peter Pearson's Edation. (2nd Edition)
4) "Parallel Processing for Supercomputers and AI", Hwang and Degroot (Eds) McGraw Hill.

4UMEP2 /2UMEF4 ARTIFICIAL INTELLIGENT SYSTEM

Unit I : Fuzzy set Theory, Introduction to Fuzzy sets, Fuzzy relation,Membership functions, fuzzification, defuzzification, fuzzy logic, fuzzy rule based system, fuzzy inference system.

Unit II : Fuzzy Decision Making, Fuzzy modeling, Adaptive neuro fuzzy inferencesystem,

cognitive neurofuzzy modelling, Neuro fuzzy control, Application of neuro fuzzy control.

Unit III : Artificial neuron model, single and multilayer perceptron neural network (MLP), Learning process: training by backpropagation, swarm particle optimization, genetic algorithm, simulated annealing, basic concept of bidirectional associative memory (BAM), self organization feature map, optical neural network.

Unit IV: Recurrent networks, Hamming network, support vector machine, counter propagation networks, cluster discovery network (ART), Applications of neural network in characters recognition, forecasting, robot kinematics, biomedical signals.

Text Books :

1) "Neural Networks", S. Hykin ,Pearson Education.
2) "Fuzzy sets and Fuzzy logic Theory and Applications", George J. Klir, Bo Yuan, PHI

Reference Books :

1) "Artificial Neural Networks", Zurada
2) "Neuro Fuzzy and Soft computing", Jang, Sun, Mezutani
3) " Introduction to Neural networks using MATLAB 6.0", S.N.Sivanandan, S. Sumathi, S.N. Deepa, McGraw Hill.
4) "Neural networks, Fuzzy logic and genetic algorithms synthesis and applications", S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI
5) Intelligent Systems & controls , Laxmidhar Behera, Indrani kar (Oxford)

4UMEP3 / 2UMEF5 ELECTIVE - II

1) BIOINFORMATICS

Unit I : Intro. To bioinformatics, databases in bioinformatics, characterization in bioinformatics databases, categories of bioinformatics databases & navigating databases.

Unit II : **Biological sequence database :** Nucleotide database, literature database, protein database, Gene expressing database.

Unit III : **Tools :** Data submission tools, PDB, MMDB, CATH, FSSP, DALI & SCOp.

Unit IV : **Data Analysis Algorithms :** Sequence comparison algorithms, substitution matrics, sequence alignment algorithms.
Prediction Algorithms : Gene prediction algorithms, phyrogenetic prediction algorithms, protein structure prediction.

Text Books :

1. Bioinformatics databases, tools and algorithm by Orpita Bosu & Simminder Kaur Thukral, Oxford Uni. Press
2. Bioinformatics principles & application by Zhumur Ghosh & Bikekanand Mallick, Oxford Uni. Press.

Reference Book:

1. Intro. To Bioinformatics by Artur M. Lesk, Oxford Uni. Press.

4UMEP3 / 2UMEF5 ELECTIVE - II

2) Micro Electro Mechanical Systems

UnitI : Development of MEMS technology, present and future, challenges, Starting Materials-substrates, etching processes & patterning, material doping, bulk micromachining processes- SCREAM, PennSOIL, integration of Electronics and MEMS technology, technology characterization.

Unit II: Scaling issues of MEMS, Scaling of physical systems, computational & fabrication issues of scale. Design realization tools for MEMS : SUMMiT technology layout, design rules.

Unit III: Electro Mechanics: structural mechanics, damping, electrical system dynamics.

Unit IV: MEMS sensors: Capacitive, piezo-resistive, sensor noise. Actuators : Electrostatic, thermal, Lorentz force actuation, MEMS reliability theory & terminology.

Text Book :

1) "Micro Electro Mechanical System Design" James J. Allen - CRC Press

Reference Books:

1) "MEMS and nanotechnology based sensors and devices for communications medical and Aerospace applications", Jha A. R. - CRC Publications.
2) "MEMS Design and fabrication" Mohamed Gad-El-Hak – CRC Press
3) "MEMS : A Practical Guide to Design, Analysis and Applications" Jan G Korvink, Oliver Paul – Springer-Verlag

4UMEP3 / 2UMEF5 ELECTIVE - II

3) HIGH SPEED DIGITAL SYSTEM DESIGN

Unit I: The Importance of Interconnect Design, Ideal Transmission Line Fundamentals, Crosstalk

Unit II: Non ideal Interconnect Issues, Connectors, Packages, and Vias, Nonideal Return Paths, Simultaneous Switching Noise, Power Delivery

Unit III: Buffer Modeling, Digital Timing Analysis, Design Methodologies

Unit IV: Radiated Emissions Compliance and System Noise Minimization, High-Speed Measurement Techniques

Text Books :

1) "High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices" Stephen H. Hall Garrett W. Hall, James A. McCall - John Wiley & Sons, Inc.
2) "High-Speed Digital Design: A Handbook of Black Magic" Howard Johnson – Prentice Hall publication

Reference Books:

1) "High Speed Signal Propagation: Advanced Black Magic" Howard W. Johnson
2) " Signal Integrity Issues and Printed Circuit Board Design" Douglas Brooks – Prentice Hall
3) "Signal Integrity – Simplified" Eric Bogatin – Prentice Hall
4) " Noise Reduction Techniques in Electronic Systems" Henry Ott -John Wiley & Sons.

5UMEP1 / 3UMEF1 SEMINAR AND DISSERTATION

AND TECHNICAL PAPER WRITING

6UMEP1 / 4UMEF1 SEMINAR AND DISSERTATION

AND TECHNICAL PAPER WRITING

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